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ABSTRACT

The purpose of the FAUL Technical Memoranda (FTM) series is to disseminate quickly to librarians and information scientist the objectives, methods, procedures, analyses, conclusions, and recommendations relating to the performance of small projects in applied research. This report is an account of a study to develop a document delivery service between the Five Associated University Libraries (FAUL). The approach and activities of the Access Committee and the FAUL Central staff about materials and people movement among the libraries during the 1969-70 academic year are described. The primary objective of the experiment was to measure and compare the transportation modes under consideration in terms of speed, cost per pound and predictability. The results are presented in tables. An appendix summarizes the usage and costs of the service. The recommendation that the pilot system be extended from June 1970 until January 31, 1971 was followed, however, all the data requested in the recommendation were not collected and was not incorporated into the report. (Author/NH)

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Office of the Coordinator of Library Systems

MATERIALS TRANSFER:

A REPORT OF

A PILOT DOCUMENT DELIVERY SERVICE

November 1969 - June 1970

Elizabeth Pan and Ron Miller,
Five Associated University Libraries

With an appendix summarizing the
experiment, June 1971.

by Glyn T. Evans,
Five Associated University Libraries

September 1971

1

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INTRODUCTION

The purpose of the FAUL Technical Memoranda (FTM) series is to disseminate quickly to librarians and information scientists the objectives, methods, procedures, analyses, conclusions, and recommendations relating to the performance of small projects in applied research. These projects may be imbedded in large long-term efforts, or they may have been undertaken to answer specific questions which bear upon the rational improvement of library procedures and services. Furthermore, such research may have been done wholly within a single library and by its own staff, or by the FAUL Central staff or committees, or by outside specialists under contract.

The material contained within these reports is used by appropriate FAUL staff in planning and decision-making, as well as for preserving an historical public record of the technical interests of the Five Associated University Libraries.

The material contained herein should not be reproduced in any form without written permission of the authors. Publication in this series in no way denies an author from disseminating the information in other forms. Comments, corrections, and suggestions for improvement are most welcome.

These memoranda are routinely sent to the ERIC/Clearinghouse on Library and Information Science for announcement in its publications and in *Research in Education*.

Coordinator of Library Systems
Five Associated University Libraries

FOREWORD

This Report is an account of a study to develop a document delivery service between the Five Associated University Libraries.

It was written in the summer of 1970 and contains a recommendation that the pilot system be extended from June 1970 until January 31, 1971 to permit further evaluation of the service. The service was extended as recommended but in the event, partly due to the resignation of Mr. Miller and the interval pending the appointment of the new Coordinator, all the data requested in the recommendation were not collected.

In March 1971 the Board of Directors of FAUL ordered the cancellation of the United Parcel Service contract, effective May 31, 1971.

An appendix summarizing the usage and costs of the service has been added by the new Coordinator, but otherwise the Report stands essentially as it was originally written.

Glyn T. Evans
Coordinator of Library Systems
September 1, 1971

1.0 BACKGROUND

In September 1968 the Board of Directors of the Five Associated University Libraries created the Access Committee and charged its members with the following:

"To study, develop, and recommend procedures for increasing the ease of access to FAUL holdings by its user populations. Investigation should emphasize cooperative activities in circulation control, intra-FAUL loans and intra-FAUL information channels. At least one member of the FAUL Systems Committee should be a member of the Access Committee. Formal written reports of activities and recommendations for action should be made to the Board at the request of the Chairman."

Appointments to the Committee were made by the five library directors during October 1968 as follows: *Marion Hanscom*, Head of Circulation, SUNY-Binghamton; *Paul Zadner*, Head of Circulation, SUNY-Buffalo; *Arthur Kulp*, Head of Circulation, Cornell University; *Harold Passineau*, Librarian, Business Library, University of Rochester, and *Metod Milac*, Assistant Director for Public Services, Syracuse University. *Alexander Cain*, Systems Librarian, SUNY-Buffalo, joined the Committee in November 1969 as the Systems Committee representative. *Ron Miller*, Coordinator of Library Systems (FAUL), served as secretary and integrated the Committee's activities with other programs of the consortium.

Arthur Kulp served as the Committee's first Chairman, November 1968 - December 1969 and *Metod Milac* was Chairman from January 1970 to the Committee's deactivation in August 1970.

The development of special arrangements to enhance the ease of access of library users to the resources held by the five libraries involved several investigations. First of all, the Committee agreed that the purpose of any delivery system, regardless of its configuration is to move materials and/or people among network nodes as fast as possible, at least cost and with a high degree of reliability. In addition, work effort and the number of people through which materials must pass should be minimized. From this base of agreement a pilot project was implemented and measurements taken. This report describes the approach and activities of the Access Committee and the FAUL Central staff about materials and people movement among the libraries during the 1969 - 70 academic year.

2.0 *COMPARISON OF ALTERNATIVE TRANSPORT MODES*

2.1 *Facsimile Transmission*

In theory, the use of facsimile transmission for inter-library loans provides a relatively quick method of transmitting copy from a lending library to a borrowing library.

The New York State Library FACTS pilot program evaluated the cost/benefits of facsimile transmission of library materials [1]. The data gathered from the pilot program led to the conclusion that the poor quality of facsimile copy limited severely use of the service. The report recommended therefore that the State Library should not consider the use of facsimile transmission equipment until the technology permits direct transmission of text from library materials (especially journals) and acceptable legibility of the copy. It was further concluded that the volume of interlibrary loan traffic (3,187 during the ten-month test period) and the lack of urgency of user demand did not justify the high cost of facsimile transmission. The average expenditure per filled request was calculated at \$62.10.

The Access Committee believed that the conclusions and recommendations which resulted from the experience of the New York State Pilot program were applicable to FAUL. It was upon this evidence that the first alternative method of transporting library materials between FAUL libraries was rejected.

2.2 *Material and People Delivery Systems*

The adoption of in-person borrowing privileges for faculty members and doctoral candidates in the FAUL libraries required that the study of alternative delivery systems should consider transporting people as well as materials. The Committee observed that in-person use and borrowing of materials was inexpensive compared to the cost of supplying the materials through ILL and that no significant burden had been placed upon the circulation staff in FAUL libraries as a result of FAUL in-person borrowing privilege agreements. It was felt that a delivery system which allowed easy movement of documents and users would increase the frequency and ease of access to materials not located in the user's home library. Two delivery systems capable of transporting both people and materials were identified: (1) air transportation through the lease

of a helicopter and (2) motor vehicle transportation through either leased vehicles with drivers or purchase of the vehicles with hired drivers.

In the first system, the feasibility of renting a Bell 206A Jet Ranger helicopter was examined. With a total pay-load of 836 pounds, the helicopter could carry a maximum of four average passengers ($4 \times 160 \text{ lbs.} = 640 \text{ lbs.}$) as well as interlibrary loan packages (196 lbs.). An estimated 7.5 hours weekly flying time would be required to permit delivery at any FAUL library within 24 hours. At the rate of \$140 an hour the annual cost would be ($7.5 \times 50 \text{ weeks} \times \$140 = \$52,500$) or \$10,500 per institution. It was felt that this cost could not be justified at present, if only inter-library traffic were considered. If other institutions were added to the route and other academic and administrative purposes were served, the pro-rated cost might be justified. In the second system, leasing of vehicles would eliminate the problems associated with ownership such as maintenance, personnel and administrative costs. The purchase of vehicles would require the hiring of drivers, insurance coverage, vehicle housing and servicing. On the credit side, in addition to ownership of the property, purchase would permit responsive flexibility in routing. The cost of leasing was estimated at \$12,850 per vehicle per year compared to \$13,050 per vehicle per year for the purchase and maintenance of vehicles and operators' wages.

The implementation of either scheme would have to take into consideration existing and planned delivery systems such as the "NYSILL (New York State Interlibrary Loan) Thruway System" and the regional 3R's (New York State Reference and Research Library Resources) systems in western Rochester, South Central, and Central New York regions. Central New York and Southern Region 3R's have hybrid delivery systems operating. Furthermore the implementation of either scheme requires that the optimal network configuration be built from the 120 possible routes. Dr. Gerald Lazorick and Mr. Ralph Hall of the Technical Information Dissemination Bureau of SUNY at Buffalo were contracted to determine the optimal network configuration for both schemes. Specific constraints and requirements were specified by the Access Committee. No feasible alternatives were suggested for a material and people delivery system which could perform within the specified constraints [2]. Three alternative configurations

for a document delivery system utilizing leased vehicles were identified by this study (see section 6.3 below). Based on required travel time, work time and distance travelled the optimal configuration consisted of a two-week cycle with a "Syracuse-Binghamton-Ithaca-Syracuse" route during the first week and "Syracuse-Buffalo-Rochester-Syracuse" route during the second week. Each library would be visited three times during one week and twice during the second week. Twenty-four hour deliveries could be made to two libraries and forty-eight hour deliveries to the other libraries. With Syracuse as the home base, work days for drivers would be less than eight hours. Reversal of routes on alternate trips would assure that all libraries have equal exposure to twenty-four hour deliveries during the cycle period.

The Access Committee felt again that these alternatives could not be justified by FAUL ILL activity alone. The Committee recommended that the consideration of either transportation modes be delayed until the traffic of people and materials between FAUL libraries is known to be high enough to warrant them. No way has been devised to record how many people move among the universities over a reasonable time sample.

2.3 Material Delivery Systems

The remaining alternatives cannot be used to transport people as well as materials: they have the capability of transporting library materials only. Traditionally, U. S. Mail is the primary method of transporting ILL materials. Special Delivery, First Class, Fourth Class Book Rate, Special Fourth Class Library Rate and Parcel Post are used depending upon the urgency of the request and the weight of the document. U. S. Mail provides relatively inexpensive service. However, it is unpredictable and, except for Special Delivery and First Class Mail, causes additional delay by delivery to the campus mail room rather than directly to the library which made the original request.

The use of a commercial service such as United Parcel Service (UPS) is increasing in situations where a cooperative interlibrary loan agreement exists which is more streamlined than ALA national or regional policies. The Committee feels that the special relationship between FAUL libraries

ALTERNATIVE MATERIAL TRANS. MODES	NODES	FREQ.	TOTAL COST/YEAR	FINANCIAL SUPPORT	ADVANTAGES	DISADVANTAGES
Telefax	7	on demand	depends on traffic	FAUL	speed	poor legibility, high cost
Helicopter	5	daily	\$51,000	FAUL	speed	material & people moved
Purchased vehicles	5	every 2nd day	\$13,050	FAUL	flexible routing, equity, material & people moved	vehicle housing, maintenance, administration, insurance
Leased vehicles	5	weekly round trip	\$12,850	FAUL	flexible routing, material & people moved, no maintenance insurance, etc.	no equity
UPS	5	weekly	partially dependent upon traffic plus pick-up charge.	FAUL	expandable, central billing, predictable, permits statistical monitoring	materials only
U. S. Mail: Spec. Del. 1st Class Parcel Post Book Rate Library Rate	5	on demand	depends on traffic	each member pays one way	inexpensive, paid as used	materials only, relatively slow, low predictability

Table 1
COMPARISON OF ALTERNATIVE MATERIAL
TRANSPORT MODES

is such a situation and that its cooperative efforts can lead to the treatment of each FAUL library as a branch in a single multi-campus system.

Table I compares the various transportation modes noting the advantages and disadvantages of each.

2.4 Selection of United Parcel Service

Of the alternative material transport modes open for consideration, UPS seemed to offer distinct advantages. The FAUL Access Committee recommended that a pilot document delivery system under contract to UPS be implemented for the period from November 1969 to May 1970. The Committee identified the following advantages of UPS as the basis for its recommendation:

1. The UPS rate is lower than comparable U. S. Mail service with the exception of Special Fourth Class Book and Library Rates.
2. It offers direct delivery to the library mail room (assuming university policy will allow it) thereby eliminating delays due to campus distribution of mail. U. S. Mail Special Delivery and First Class offer the same service but at a much higher cost per pound.
3. It permits centralized billing.
4. The expected delivery time is 24 hours regardless of distance.
5. Regularly scheduled pick-ups and deliveries make UPS more predictable and dependable than U. S. Mail.
6. There are no overhead expenses associated with the use of UPS.
7. The contract can be modified to accommodate demand.
8. A pilot document delivery system would provide the opportunity to monitor and gather relevant data upon which to base further action.

The recommendation to use UPS as the primary mode of material transport between FAUL libraries was approved by the FAUL Board of Directors and the pilot system began in November 1969.

3.0 DATA ANALYSIS OF U.S. MAIL AND UPS

3.1 Objectives of the Experiment

It is commonly assumed that the less time it takes to deliver a package, the higher is the cost of the transportation mode. U. S. Mail rates are based on this assumption. It costs more to have a package delivered by Special Delivery than by First Class Mail or Special 4th Class Library Rate presumably because Special Delivery is faster than the other modes. This assumption was tested as an hypothesis in an experiment in which various transportation modes were used to deliver interlibrary loan packages between FAUL libraries.

The primary objective of the experiment is to measure and compare the transportation modes under consideration in terms of speed, cost per pound and predictability. A rank matrix of the transportation modes was developed. (see Table II). The optimal mode combines the fastest delivery, lowest cost and highest delivery predictability factor. The transportation modes are also evaluated on the basis of secondary factors which reflect on their desirability as material transport modes:

- o Ease of obtaining management data about loads, costs and traffic as a part of the system
- o Package preparation time, effort, expense required
- o Pick up directly from library
- o Delivery directly to library.

Table II
Optimization Chart of
Four Modes of Book Delivery

	Spec. Del.	1st Class	UPS	Lib. Rate U.S. Mail	
Speed	1	2	3	4	MODE RANK (lowest no. is best)
Cost/lbs.	4	3	2	1	
Delivery pre- dictability	3	2	1	4	
TOTALS	8	7	6	9	
Requires wrap- ping	Y	Y	Y	Y	OPTIMUM
Pick-up from Lib.	Y	N	Y	N	
Delivery to Lib.	Y	N	Y	N	
Lowest possible unit cost	.41 (1 oz.)	.06 (1 oz.)	.55 (1 lb.)	.05 (1 oz.)	

3.2 Definitions of Terms

Prior to explaining the methodology used in the experiment it is necessary to define some of the terminology used:

- o Transportation Mode: the means of transporting materials, i.e. UPS, the various classes of U. S. Mail, helicopter, etc.
- o Transaction: the delivery of an interlibrary loan package from the source ILL desk to the destination ILL desk.
- o Route: the path taken during the movement of package from a lending library to a borrowing library, e.g. Cornell-to-Binghamton (given five participating libraries, there are 120 possible routes).
- o Average Elapsed Time (AET): the number of hours (rounded off to the nearest half hour) required to deliver a package from the source ILL desk to the destination ILL desk, regardless of route, divided by the number of transactions for each mode. Basic to this formulation is the assumption that delivery routes do not affect the time required to deliver a package.
- o Weighted Average Elapsed Time: the AET weighted by a week-end elapsed time factor.

3.3 Data Gathering Procedures

Among the nine transportation modes identified and described in section 2 (see Table 1), the first four modes (Telefax, helicopter rental, purchase or lease of a fleet of FAUL delivery vans or station wagons) were rejected by the Access Committee from initial consideration. Since these transportation modes required relatively expensive short-term money outlays, the Committee felt that the selection of any one of them should be justified by valid operating data gathered over a reasonable test period. U. S. Mail Book Rate was also excluded since it cost more than Library Rate for the same service. Similarly, U. S. Mail Parcel Post cost slightly more than UPS and had the additional disadvantage of delivery to the campus mail room rather than to the library. An additional mode, Greyhound Package Delivery Service was also rejected primarily because of

inconvenience. This mode is discussed in more detail in a companion report to this document. An Analysis of Book Storage and Transportation Requirements of the Five Associated University Libraries, by Tesfaye Dinka and Davut Okutcu, August 1970 (FAUL Technical Memorandum FTM 70-3).

The remaining modes were tested in the experiment.

For the first two weeks of April 1970, the interlibrary loan librarians of the FAUL libraries were asked to mail all interlibrary loan packages to member libraries by U. S. Mail. The sequence of Special Delivery, First Class and Special Fourth Class Library Rate was recommended as a cycle in order to obtain a reasonable distribution curve for each mode. Few libraries adhered to this recommendation. A record was made of each transaction noting the following information:

- o Source library
- o Date sent
- o Time the package left the ILL desk
- o Transportation mode (i.e. Special Delivery, First Class, Library Rate)
- o Name of destination library
- o Date received
- o Time package arrived at ILL desk

During this time period a total of 46 transactions were made. Of this total, 8 transactions were invalidated for our use due to unmarked transportation mode, lack of date or unknown destination. The remaining transactions fell into the following categories:

Special Delivery	5
First Class	7
Library Rate	<u>26</u>
Total	38

For the entire month of May, the interlibrary loan librarians of the participating libraries were asked to send all interlibrary loan packages to FAUL libraries by UPS. The same data were gathered for each transaction. There were 109 UPS transactions recorded for the month of May.

Sixteen routes were represented in the UPS sample.

3.4 Calculation of Speed, Cost and Predictability

The results of the experiment are summarized in the optimization chart (See Table II).

Speed is measured in terms of Weighted Average Elapsed Time (AET) (see definition of AET in Section 3.2).

In the process of analyzing the data, it was noted that transactions involving week-ends were unevenly distributed among the transportation modes. For example, 33% of the UPS transactions compared to 80% of the Special Delivery transactions fell on week-ends. The effect of transactions falling on week-ends was to increase the AET of the mode. To equalize this effect the proportion of week-end to non-week-end transactions should be the same in each mode:

- A = Average percentage of week-end transactions
- B = Average percentage of non-week-end transactions
- C = Weekend AET
- D = Non-weekend AET

For each mode:

- $A \times C = \text{AET for week-end transactions}$
- $B \times D = \text{AET for non-week-end transactions}$
- $(A \times C) + (B \times D) = \text{Weighted AET}$

Table III summarizes the data used in the calculation of weighted AET. The letters A, B, C, D in Table I correspond to the symbols used in the formula.

Table IV presents the results of the calculations and shows the ranking of the modes by the weighted AET.

Table III

Data Used in the Calculation of Weighted AET
for UPS and U. S. Mail

TRANSPORTATION MODE	TOTAL SAMPLE	WKEND TRANS.	A		B		D	
			% OF TOTAL TRANS.	WKEND AET(hrs)	NON-WKEND TRANS.	% OF TOTAL TRANS.	NON-WKEND AET (hrs.)	
UPS	109	36	33	105.6	73	66	37.6	
Spec. Del.	5	4	80	84.4	1	20	41.5	
1st Class	7	4	58	100.3	3	42	25.5	4
Lib. Rate	26	12	48	113.3	14	52	52.6	
Average			54.7 (A)			45.3 (B)		

Table IV

Weighted AET and Rank of UPS & U. S. Mail
(lowest number is best)

Channel	A·C*	B·D*	Weighted AET	RANK
	Weekends AET (hrs.)	Non-Weekends AET (hrs.)		
UPS	57.7	16.9	74.6	3
Sp. Del.	46.2	18.7	64.9	1
1st Class	54.7	11.5	66.2	2
Library Rate	62.0	23.7	85.7	4

* See page 13 for discussion

RATES

U. S. Mail rates are based on weight, not distance. Since all the established routes fall within Zone 2 for UPS, it can be said that the rates of each transportation mode are a function of weight.

The lowest weight common to all modes is one pound. While U. S. Mail rates have break-downs for packages weighing less than one pound, UPS does not. In view of the trend to supply photocopies rather than the original whenever it is feasible, this is an important consideration. The rates are compared in Table V.

In addition to the published rates, the cost of using UPS includes a pick-up charge of \$2.00 a month applied to three out of the five libraries. Therefore, for the seven accounts which FAUL has with UPS, an additional charge of \$1.143 per account should apply to any calculation involving account averaging ($4/7 \times \$2.00 = \$1.143$). SUNY at Binghamton and Buffalo, being State universities, are not assessed the charge, and they are responsible for three accounts. (See Appendix 6.1).

Table V
Rate Schedule for UPS and U. S. Mail

RATES				
Weight (in lbs)	UPS ^{1/}	Sp. Del. ^{2/}	1st Class ^{2/}	Library Rate ^{3/}
1	.55	1.10	.80	.05
2	.59	1.46	1.16	.07
3	.64	1.94	1.64	.09
4	.68	2.52	2.12	.11
5	.73	2.90	2.60	.13
6	.77	3.38	3.08	.15
7	.82	3.86	3.56	.17
8	.86	4.34	4.04	.19
9	.91	4.82	4.52	.21
10	.95	5.30	5.00	.23
11	1.00	5.78	5.48	.25
12	1.04	6.26	5.96	.27
13	1.09	6.74	6.44	.29
14	1.13	7.22	6.92	.31
15	1.18	7.70	7.40	.33
16	1.22	8.18	7.88	.35
17	1.27	8.66	8.36	.37
18	1.31	9.14	8.84	.39
19	1.36	9.72	9.32	.41
20	1.40	10.10	9.80	.43

^{1/} UPS rates for Shippers in New York, etc., Effective August 3, 1970.

^{2/} U. S. Post Office Department Domestic Postage Rates, Fees, and Information, Effective October 31, 1963.

^{3/} Washington Newsletter, 22:10 (May 26, 1970).

PREDICTABILITY

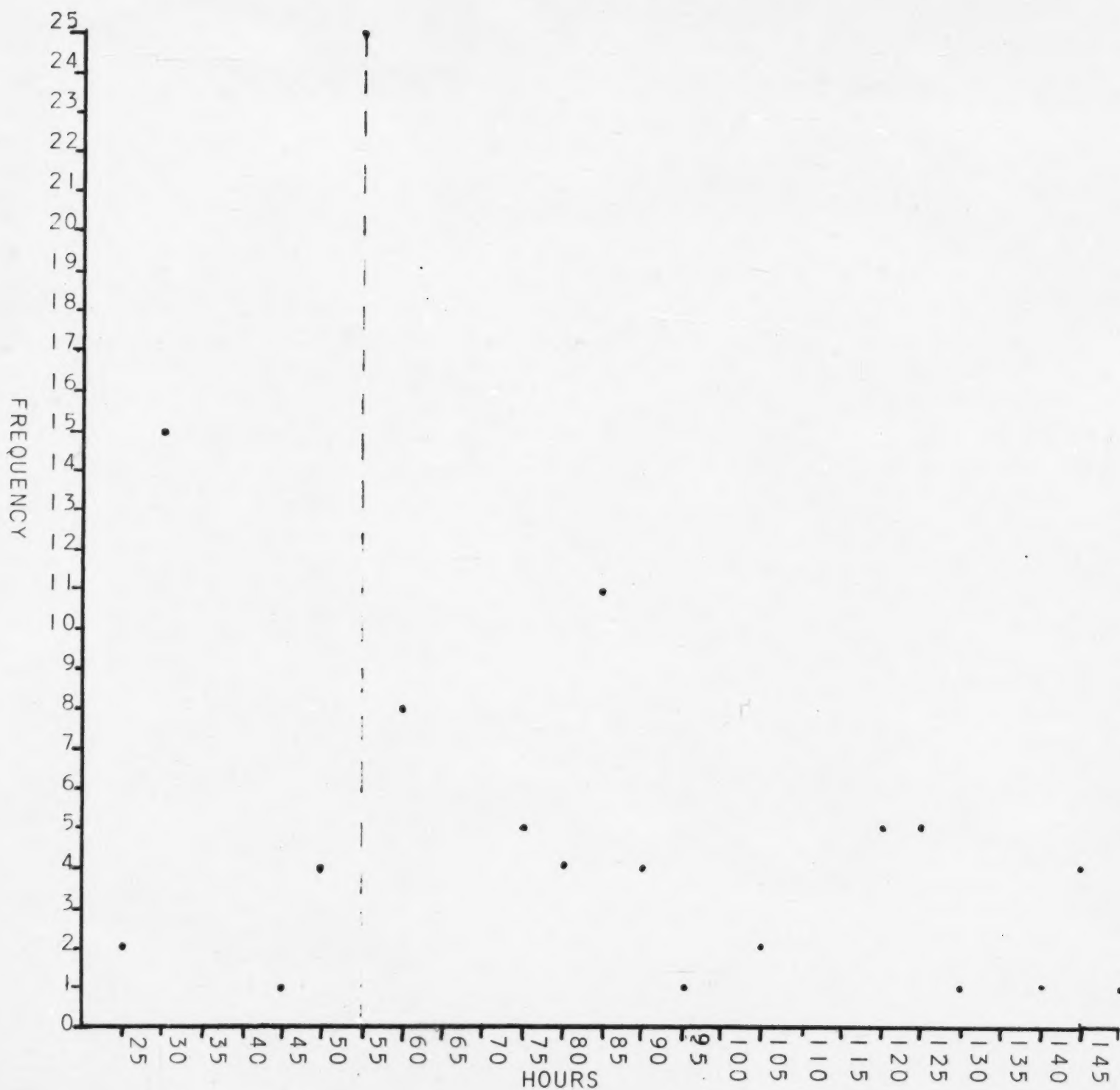
The formula for standard deviation is used normally on experimental data to measure deviation from a statistical mean. Unfortunately the size of most samples does not yield a normal curve and precludes the valid use of standard deviation to indicate the predictability of the mode. Based on available data, predictability can be defined as the probability that a transaction will be completed within the average delivery time. Figures 1-4 show the distribution of transactions according to the number of elapsed hours from pick-up to delivery. For each mode, the range of time is indicated by the minimum and maximum number of elapsed hours, the statistical mode, i.e. the number of elapsed hours required by most of the transactions, and the weighted AET are noted.

Table VI summarizes the above data and ranks the transportation modes according to their predictability.

Table VI
Predictability of UPS and U. S. Mail

TRANSPORTATION MODE	MIN*	MAX*	MODE*	WEIGHTED AET*	PREDICTA- BILITY	RANK**
UPS	24	145	50	74.6	67%	1
SPEC. DEL.	40	95	75	64.9	20%	4
1ST CLASS	25	120	25	66.2	57%	2
LIBRARY RATE	25	170	50*** 95	85.7	53%	3

* in hours
 ** lowest number is best
 *** frequency is Bi-modal

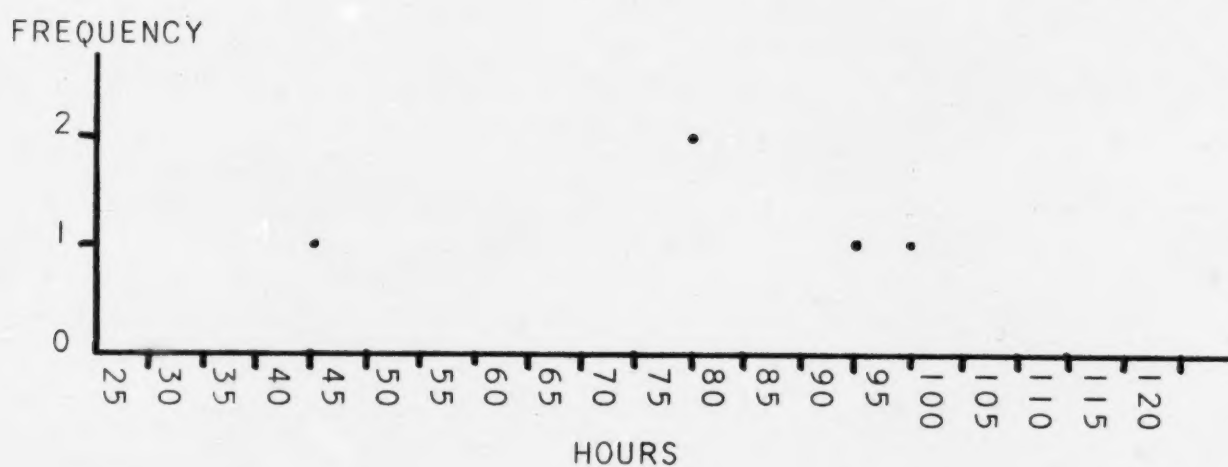


Min. - 25 hours
 Max. - 145 hours
 Weighted mean - 74.6 hours
 Mode - 50 hours

23

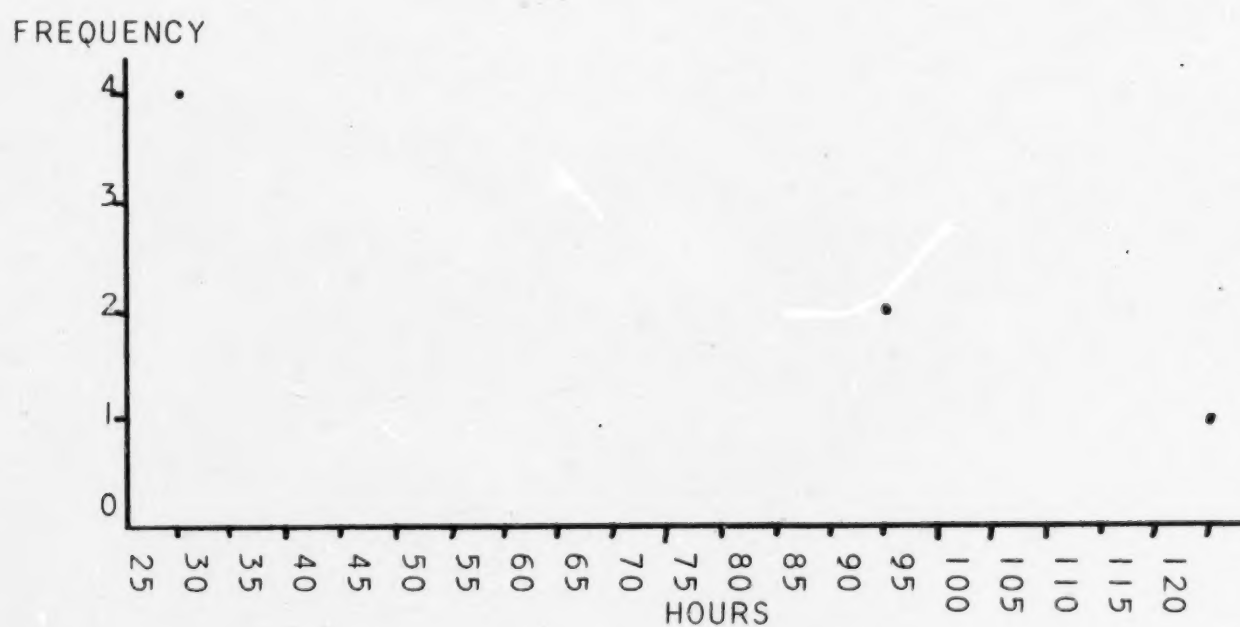
19

Figure 1
 UPS Elapsed Time in Hours



Min. - 40 hours
Max. - 95 hours
Weighted mean - 64.9 hours
Mode - 75 hours

Figure 2
SPECIAL DELIVERY: Elapsed Hours

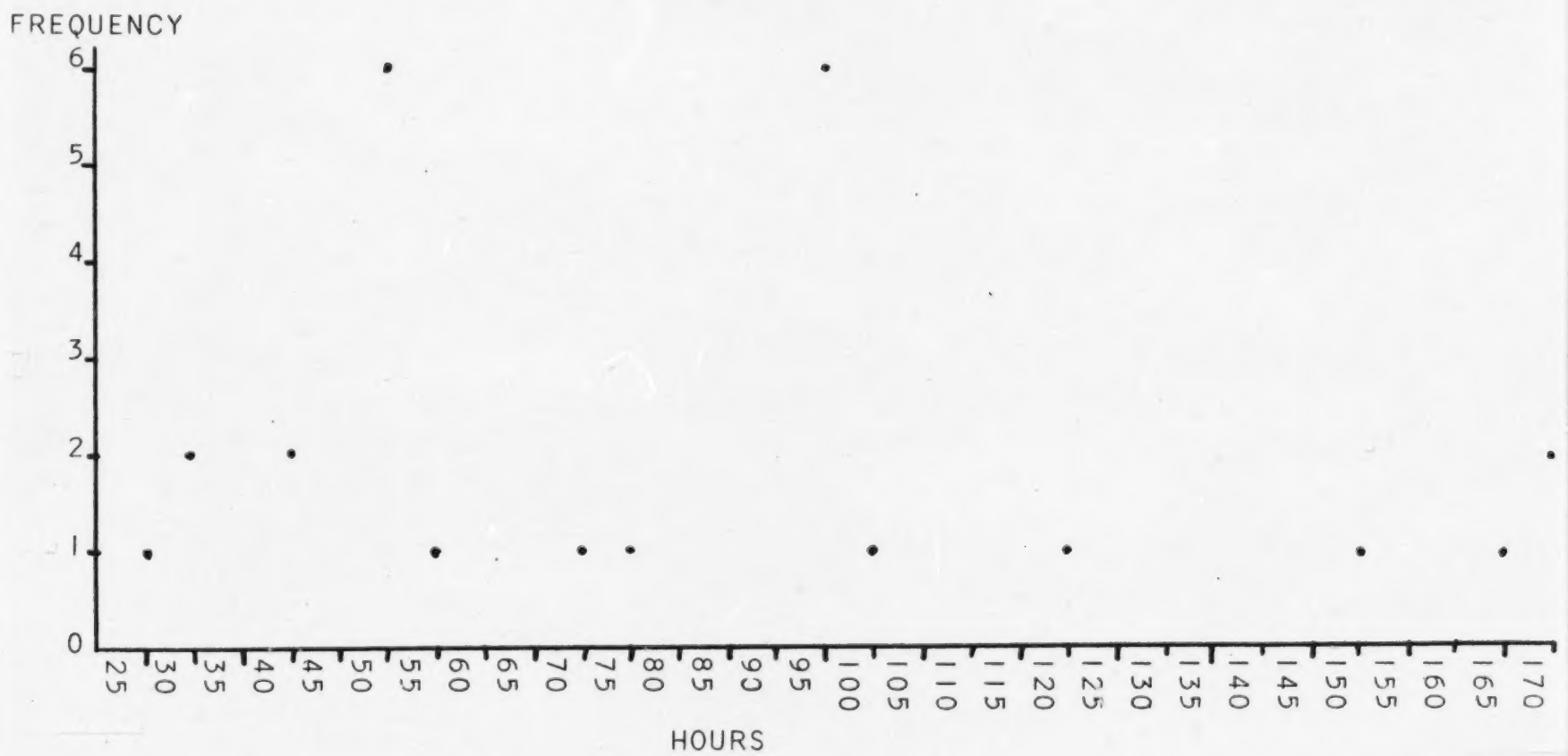


Min. - 25 hours
Max. - 120 hours
Weighted mean - 66.2
Mode - 25 hours.

Figure 3

First Class: Elapsed Hours

25



Min. - 25 hours
 Max. - 170 hours
 Weighted mean - 85.7 hours
 Mode - 50 and 95 hours*

Figure 4
 LIBRARY RATE: Elapsed Hours

* The bimodal effect is due to the equitable distribution of weekend (48%) to non-weekend transaction (52%).

3.5 *ILL Traffic between FAUL Libraries*

There are currently seven active UPS accounts - one for each FAUL library plus one for the Health Sciences Library at Buffalo and one for Miner Library at Rochester. Appendix 6.1 lists the account numbers, starting dates and address of each account.

After the pilot system had been operational for four months the question was raised regarding the use of UPS for transporting materials other than ILL. Specifically Syracuse and Binghamton were interested in using UPS to deliver PL 480 material between the two libraries. The load and cost generated by PL 480 was estimated to add \$756.00 to the annual cost of the delivery system. Since the additional cost was to be assessed against the specific users, the Committee approved the use of UPS for transporting PL 480 materials between Syracuse and Binghamton. To date this charge has not appeared on the bills monitored by FAUL Central and other arrangements have, presumably, been made. Approval was given to Binghamton to transport some decks of punched cards, an insignificant additional cost.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The experiment comparing UPS and U. S. Mail in terms of speed, cost and predictability of delivery time shows UPS to be optimum for the present. Table VI summarizes the relative ranking of the various modes. The modes are also compared in terms of package preparation, pick-up from and delivery to the library and the lowest unit cost.

Recommendation: Based on these data it is recommended that the use of UPS as the primary mode for transporting materials between FAUL libraries be continued for another 6 months as an extension of the test period and a further evaluation be made at that time (January 31, 1971).

Although the available data were sufficient to allow us to derive conclusions on the relative merits of the modes, the samples for Special Delivery and First Class Mail were too small to allow us to place full confidence on the absolute numbers. The size of the sample created unforeseen problems related to the inequitable representation of routes and the disproportionate distribution of week-end to non-week-end transactions. The use of separate transaction records placed an additional burden on ILL personnel which could have been avoided by extracting the required data from ILL or TWX forms. It also resulted in errors in recording the data which invalidated some transactions in already small samples.

Recommendation: it is further recommended therefore that the use of UPS be continuously monitored during the extended test period and a larger sample be gathered over a three-month period using ILL and TWX forms in order to test the validity of the results of the completed experiment. It is suggested that the second experiment should gather data to answer the following questions:

1. Why did UPS not meet the expected turn-around of 24 hours regardless of distance? Is there anything that can be done to increase the speed of delivery by UPS within the present rate structure?
2. What proportion of the total time required to fill an ILL request is attributed to the delivery mode? If it is determined that delivery time accounts for 10% of the total time required to get the material to the user, then an improved performance of the delivery system of 20% affects the total time by 2%.

Based on this type of information it may be concluded that resources can be more effectively expended by increasing the efficiency of the time required for each step in the process of filling an ILL request. A time and motion study may be required to determine the allocation of resources for each step identified by the gross flow. The resulting data will pinpoint areas requiring attention and aid in the assignment of priorities of solutions to be undertaken. Recommendations to simplify internal procedures, augment staff and provide bibliographic access to a union catalogue can be made based on the results of the study.

3. What proportion of the total ILL requests received from FAUL libraries are filled by photocopy? What is the average weight of an ILL package to FAUL libraries including photocopies and originals? If it is found for example that 60% of all ILL packages sent to FAUL libraries weigh less than 1/2 lb. the use of a document delivery system such as UPS should be reviewed. It is clear that U. S. Mail is both faster and cheaper due to smaller unit cost breakdowns.

The objective of a delivery system is to bring the user and the material together. This can be achieved either by delivering the material to the user or transporting the user to the materials. Statistics show the traffic between FAUL libraries generated by in-person borrowing privileges to be light [ACCOM 7]. What is not known is the number of requestors initiating ILL in the FAUL libraries. It would seem logical that the user, rather than the materials could be moved in case of the heavy use of a collection by a smaller number of users. The trade-off here is the time and cost of delivering materials to users, versus the time and cost of transporting the users to the materials.

5.0 BIBLIOGRAPHY

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PROJECT DOCUMENTATION*

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FAUL Delivery System information sheet, by Ron Miller to Pat Battin, Rolfe DePuy, Paul Eldridge, Marion Mullen, Mary Oemisch, Paul Zadner, Mary Cassata, dated 9 September 1969, 2p.

FAUL Delivery Service: Turn-around time report form instructions, dated 25 November 1969, 3p. (Accom 10.5)

FAUL Delivery Service: Weekly Flow Report Form, Winter 1969, 1p. (Accom 10.6)

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ACCOM delivery system: Planning Report #1, Preliminary Alternatives and costs, by Ron Miller to FAUL Access Committee, Spring 1969, 5p. (Accom 11)

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ILL Campus/Post Office Test (see ACCOM Minutes March 27), by Ron Miller to Access Committee, Spring 1969, 1p.

- * References in this Section are to internal FAUL reports and minutes. The designation ACCOM followed by a number refers to the appropriate Access Committee file.

6.0 APPENDICES

6.1 Chart of United Parcel Service Account Numbers, Service Delivery Dates and Delivery Addresses

Account No.	Beginning Dates	Pick-up and delivery addresses
SUNY-Binghamton 12192	September 20, 1969	Inter-Library Loan Library SUNY-Binghamton Ground Floor Receiving Department Binghamton, N. Y. 13901
SUNY-Buffalo 125339	October 27, 1969	Inter-Library Loan Lockwood Library SUNY at Buffalo Buffalo, N. Y. 14214
124398	October 27, 1969	Inter-Library Loan Health Science Library Capen Hall SUNY at Buffalo Buffalo, N. Y. 14214
Cornell 124084	November 10, 1969	Inter-Library Loan Olin Library Shipping Room Cornell University Ithaca, N. Y.
Rochester 128254	December 1, 1969	ILL University of Rochester Library River Campus Station Rochester, N. Y.
120155	December 1, 1969	Inter-Library Loan (pick-up) E. G. Miner Med. Library University of Rochester School of Med. & Dentistry 260 Critten Blvd. Rochester, N. Y. 14620 Receiving & Shipping Dept. (delivery) Bldg. S & A Ground Floor Strong Memorial Hospital Rochester, N. Y. 14620

Account No.	Beginning Dates	Pick-up and delivery addresses
Syracuse 125651	October 28, 1969	Inter-Library Loan Library Processing Center Sims Hall Syracuse University Syracuse, N. Y. 13210

* 6.2 FAUL Document Delivery Service: Example Running Costs per Week Based on UPS Invoices

* See also Tables VII and VIII

	June				Cum	July				Total	Cum
	6	13	20	27		4	11	18	25		
Bing. pkg. wt. \$	3 13 1.95	1 6 .72		1 2 .54	84 627 107.71	4 18 1.26	2 10 1.36	1 14 1.08		7 42 3.70	91 669 111.4
Buf. pkg. wt. \$	9 22 5.08	3 9 1.76	5 19 3.16	8 34 5.16	236 712 150.42	3 11 1.85	3 12 1.90		9 11 4.58	15 34 8.33	251 746 169.2
35 124398 \$	18 51 10.46	8 26 4.79	4 8 2.17	2 4 1.08	241 760 143.52	5 21 3.20	8 24 4.70	10 35 6.10	12 53 7.81	35 133 21.81	276 893 165.3
Corn. pkg. wt. \$	7 18 5.98	8 31 7.03	7 30 6.51	6 41 6.56	293 1526 259.29	7 23 6.19	12 63 10.25	8 45 7.64	9 45 8.10	36 176 32.18	329 1702 291.4
Syr. pkg. wt. \$	1 1 .50	1 8 .81	5 25 3.39	5 27 3.47	158 526 119.74	2 13 1.49	11 124 10.56	5 19 3.11	10 134 10.53	28 290 25.69	186 816 145.4
Roch. pkg. wt. \$	3 9 3.76	5 16 4.98	7 56 7.69	5 14 4.88	138 522 145.58	1 2 2.54	3 10 3.81	3 12 3.90	7 38 7.13	14 62 17.38	152 584 162.9
Roch. (Med) pkg. wt. \$	3 10 3.81	5 16 4.98	3 11 3.85	2 10 3.35	116 559 142.62	3 7 3.67	7 39 6.92	4 24 4.90	2 6 3.17	16 76 18.66	132 635 161.2
Totals pkg. wt. \$	44 124 31.54	31 112 25.07	31 149 26.73	29 132 25.04	1266 5058 1079.28	25 95 20.20	46 282 29.50	31 149 26.73	49 287 41.32	151 813 127.75	1417 5871 1207.0
M \$ per acct.	4.51	3.58	4.48	3.58	154.59	2.88	5.64	4.46	6.89	19.87	174.4
Week No.	26	27	28	29		30	31	32	33		

6.3 *Network Analysis*

The following pages contain a report of a commissioned study for optimizing delivery distances among the five libraries. The work was performed by Dr. Gerald Lazorick and Mr. Ralph Hall at that time Director and staff member respectively of the Technical Information Dissemination Bureau of SUNY at Buffalo. The results of this analysis are discussed in other parts of this report.

22 Cottonwood Drive
Williamsville, New York 14221
June 17, 1969

Mr. Ronald Miller
Coordinator of Library Systems
Five Associated University Libraries
106 Roney Lane
Syracuse, New York 13210

Dear Ron,

Attached are the results of our study concerning network configurations. For Scheme 2, three alternatives were considered. The first alternative involves a circuit through all libraries. Any library could be home base and the solution indicates the route (this is the classical travelling salesman problem - there are 120 possible routes). The second alternative involves a trip to two libraries and a return to home base. Syracuse is recommended as home base and the routes are recommended. The third alternative involves trips to three libraries and a return to home base. Ithaca is recommended as home base. Unfortunately, we were unable to come up with anything worthwhile for Scheme 1 within the constraints provided. We would recommend using Scheme 2, alternative 2 with Syracuse as home base. A near optimal solution could be had with this alternative using Ithaca as home base.

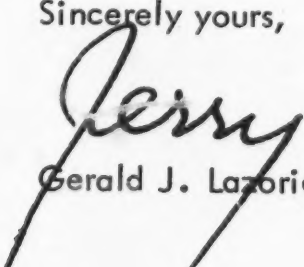
We used the mileage and times which you gave us except for the Buffalo-Binghamton travel time which we changed from 4.5 to 4 hours. We did this for two reasons:

1. The Buffalo-Syracuse time presented was 2.5 and the Syracuse-Binghamton time presented was 1.5 which means that (if the times were correct) that it would be better to go Buffalo-Syracuse-Binghamton rather than Buffalo-Binghamton.

2. We feel that 4 hours is a better time.

If we could elaborate, etc., let us know.

Sincerely yours,


Gerald J. Lazorick

GJL:pt
att.

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SCHEME I

Problem: Determine the optimal (time) routes for people and materials to be transported from one FAUL campus to another. People must arrive at their destination not later than 11:00 A.M. People returning to home institutions must leave the "visited" library no later than 5:00 P.M. Travelers should leave and return on the same day. If possible, travelers should leave from their home library between 8:00 and 9:00 A.M. The scheme should be considered for a two week cycle of three trips in week 1 and two trips in week 2. More than one station wagon and driver may be considered.

Comments. We do not feel that this scheme is feasible within the constraints presented. In addition, we had added another constraint regarding the operator, viz. that he would not be required to spend more than 11 hours in one day. Some alternatives are possible. However, none would satisfy all constraints. It would not be unreasonable to operate one vehicle from Syracuse as home base which would operate between Ithaca and Binghamton and a second vehicle which would operate between Buffalo, Syracuse and Rochester. This would permit reasonable travel and visiting times for each of the libraries in each of the circuits. Syracuse could be considered as a switching point from one vehicle to another, but this would probably result in an overnight at one of the libraries on the circuit. An alternate possibility would involve individual vehicles at four of the libraries. This is probably the most feasible scheme, but overnights may still be required.

SCHEME 2

Problem: Determine the optimal (time) route for a vehicle to pick up materials at any FAUL institution and deliver them to any other FAUL institution. Materials are to be delivered two, preferably three times per week.

Alternative Solution 1

The vehicle is operated three days per week. On each trip, the vehicle visits all FAUL libraries. Each library is visited three times per week.

Home Base	Best Route	Travel Time *	Work Time *	Distance
Syracuse	Syracuse-Buffalo-Rochester-Ithaca-Binghamton-Syracuse	9.0	10.7	463
Binghamton	Binghamton-Ithaca-Rochester-Buffalo-Syracuse-Binghamton	9.0	10.7	463
Ithaca	Ithaca-Rochester-Buffalo-Syracuse-Binghamton-Ithaca	9.0	10.7	463
Rochester	Rochester-Buffalo-Syracuse-Binghamton-Ithaca-Rochester	9.0	10.7	463
Buffalo	Buffalo-Syracuse-Binghamton-Ithaca-Rochester-Buffalo	9.0	10.7	463

Comments. With this alternative scheme, any library could be designated as home base. Each library would be visited three days per week on Monday, Wednesday and Friday. Material would be delivered on the same day or within 48 hours except on weekends when material not delivered the same day would be delayed for an additional 24 hours.

Work time has been determined as 20 minutes per stop plus travel time. If hours per day in excess of 8 hours are to be considered as overtime hours, the operator could be considered as having spent a 40 hour work week in the three delivery days. The total mileage travelled per week is 1,389 miles.

If this scheme is selected, it is recommended that the sequence of visits be reversed on alternate trips. For example, if Syracuse were the home base, then on trip 1, the sequence should be:

Syracuse-Buffalo-Rochester-Ithaca-Binghamton-Syracuse

On trip 2, the sequence should be:

Syracuse-Binghamton-Ithaca-Rochester-Buffalo-Syracuse

Alternative Solution 2

X The vehicle is operated five days per week. On day 1, the vehicle makes a trip to two libraries and returns to his home base. On day 2, he makes a trip to the two libraries not visited on day 1 and returns to his home base. The cycle is then repeated.

* In hours

Home Base	Best Routes	Travel Time *	Work Time *	Distance
Binghamton	Binghamton- Buffalo- Rochester- Binghamton	9.00	10.00	420
	Binghamton- Ithaca- Syracuse- Binghamton	4.00	5.00	193
	Totals	13.00	15.00	613
Rochester	Rochester- Ithaca- Buffalo- Rochester	7.25	8.25	320
	Rochester- Binghamton- Syracuse- Rochester	7.00	8.00	310
	Totals	14.25	16.25	630
Ithaca	Ithaca- Buffalo- Rochester- Ithaca	7.25	8.25	320
	Ithaca- Binghamton- Syracuse- Ithaca	4.00	5.00	193
	Totals	11.25	13.25	513
Syracuse	Syracuse- Binghamton- Ithaca- Syracuse	4.00	5.00	240
	Syracuse- Buffalo- Rochester- Syracuse	6.00	7.00	320
	Totals	10.00	12.00	560
Buffalo	Buffalo- Rochester- Syracuse- Buffalo	6.00	7.00	320
	Buffalo- Ithaca- Binghamton- Buffalo	8.75	9.75	403
	Totals	14.75	16.75	723

Comments. With this alternative scheme, each library will be visited three times during one week and two times during the next week. Delivery will be made on the same day to two libraries and on the following day to the other two libraries. The material picked up on Friday will be delayed until Monday in most cases. It is recommended that, with this scheme, Syracuse be designated as home base. In addition, the selection of Syracuse will result in work days of less than 8 hours. It is also recommended that the route be reversed on alternate trips to the same two libraries. If this is done, the probability of same day delivery will be the same for all libraries. For example, if Syracuse is designated as home base, then the optimal routes are:

Syracuse- Binghamton- Ithaca- Syracuse
 Syracuse- Buffalo- Rochester- Syracuse

Using the above recommendation, the trips should be scheduled as follows:

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* In hours

Day	Route
Monday	Syracuse-Binghamton-Ithaca-Syracuse
Tuesday	Syracuse-Buffalo-Rochester-Syracuse
Wednesday	Syracuse-Ithaca-Binghamton-Syracuse
Thursday	Syracuse-Rochester-Buffalo-Syracuse
Friday	Syracuse-Binghamton-Ithaca-Syracuse
Monday	Syracuse-Buffalo-Rochester-Syracuse
Tuesday	Syracuse-Ithaca-Binghamton-Syracuse
Wednesday	Syracuse-Rochester-Buffalo-Syracuse
Thursday	Syracuse-Binghamton-Ithaca-Syracuse
Friday	Syracuse-Buffalo-Rochester-Syracuse

Alternative Solution 3

The vehicle is operated four days per week. On each day, the vehicle leaves his home base, visits three libraries and then returns home. Each library is visited three times per week.

Home Base	Best Routes	Travel Time *	Work Time *	Distance
Syracuse	Syracuse-Binghamton-Rochester-Buffalo-Syracuse	9.00	10.00	460
	Syracuse-Binghamton-Ithaca-Rochester-Syracuse	7.00	8.00	313
	Syracuse-Binghamton-Ithaca-Buffalo-Syracuse	8.75	9.75	443
	Syracuse-Ithaca-Rochester-Buffalo-Syracuse	7.50	8.50	390
	Totals	32.25	36.25	1,606
Ithaca	Ithaca-Rochester-Buffalo-Binghamton-Ithaca	9.00	10.00	423
	Ithaca-Rochester-Syracuse-Binghamton-Ithaca	7.00	8.00	313
	Ithaca-Rochester-Buffalo-Syracuse-Ithaca	7.50	8.50	390
	Ithaca-Binghamton-Syracuse-Buffalo-Ithaca	8.75	9.75	443
	Totals	32.25	36.25	1,569
Buffalo	Buffalo-Binghamton-Ithaca-Rochester-Buffalo	9.00	10.00	423
	Buffalo-Syracuse-Binghamton-Ithaca-Buffalo	8.75	9.75	443
	Buffalo-Rochester-Ithaca-Syracuse-Buffalo	7.50	8.50	390
	Buffalo-Binghamton-Syracuse-Rochester-Buffalo	9.00	10.00	440
	Totals	34.25	38.25	1,696

* In hours

Home Base	Best Routes	Travel Time *	Work Time *	Distance
Binghamton	Binghamton-Ithaca-Rochester-Syracuse-Binghamton	7.00	8.00	313
	Binghamton-Syracuse-Rochester-Buffalo-Binghamton	9.00	10.00	440
	Binghamton-Syracuse-Buffalo-Ithaca-Binghamton	8.75	9.75	443
	Binghamton-Ithaca-Rochester-Buffalo-Binghamton	9.00	10.00	423
Totals		33.75	37.75	1,619
Rochester	Rochester-Buffalo-Binghamton-Ithaca-Rochester	9.00	10.00	423
	Rochester-Buffalo-Ithaca-Syracuse-Rochester	8.25	9.25	370
	Rochester-Buffalo-Binghamton-Syracuse-Rochester	9.00	10.00	440
	Rochester-Syracuse-Binghamton-Ithaca-Rochester	7.00	8.00	313
Totals		33.25	37.25	1,546

Comments. With this alternative scheme, Ithaca should be designated as home base. This would result in minimum time and distance. Each library is visited three times each week on specific days. If this alternative scheme is adopted, it is recommended that the sequence of visits be reversed on alternate weeks. For example, if a Monday schedule calls for:

Ithaca-Rochester-Buffalo-Binghamton-Ithaca

Then, the following Monday schedule should call for:

Ithaca-Binghamton-Buffalo-Rochester-Ithaca

This would result in the probability of same day delivery being equal for all libraries.

* In hours

6.4 The Cessation of the Experiment

a. The Use of the Service

The FAUL United Parcel Delivery Service was cancelled on May 31st, 1971. Despite adequate notice, the U. P. S. continued to call at FAUL pickup points into June; thus, some parcels were picked up and delivered after the official end of the experiment. The data for that month are incorporated into the activity totals.

All invoices from U. P. S. were paid from the FAUL operating budget by the FAUL Central Office. Invoices gave details, week by week, of the number of parcels picked up from each collection point, their weight, and, of course, the amount charged. The information contained in these invoices is summarized, month by month, in the three tables VIIa, VIIb, VIIc.

LIB.	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
BI	10	13	11	5	15	12	5	7	9	6	4	10	13	11	11	8	11	16	0
BU.L	24	32	30	37	47	31	25	15	16	25	41	27	31	50	33	31	40	51	14
BU.HS	16	30	16	33	35	56	32	35	54	30	33	40	30	54	30	49	46	45	26
C	44	37	34	40	45	27	28	36	56	29	47	47	46	45	49	55	48	19	0
S	15	22	20	22	24	23	12	29	27	16	13	23	13	26	32	24	27	20	3
R.R.	27	29	18	14	19	11	20	14	60	9	27	20	12	17	21	26	21	35	9
R.M.	18	15	11	21	30	19	13	16	39	7	21	9	10	0	0	0	0	0	0
TOT.	154	178	140	172	216	179	135	151	331	122	186	176	155	203	176	193	193	186	52
																			3297

TABLE VIIa. Number of Packages handled by UPS

LIB.	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
BI	91	95	61	29	98	96	21	42	55	39	29	104	229	83	172	139	143	206	0
BU.L	52	107	95	113	98	118	94	34	124	108	172	129	217	175	133	152	174	223	65
BU.HS	54	104	54	98	115	166	89	133	82	87	116	143	132	179	98	153	130	147	87
C	197	202	157	190	229	113	120	176	178	127	244	194	194	225	176	279	270	70	0
S	42	78	67	67	116	98	61	290	49	78	48	118	74	91	261	183	132	96	16
R.R.	82	86	66	62	92	39	95	62	60	19	114	269	65	130	99	133	76	123	150
R.M.	73	46	81	104	140	68	47	76	73	37	29	47	44	0	0	0	0	0	0
TOT.	591	718	571	663	888	697	517	813	620	495	812	990	955	883	938	1087	925	864	318
																			14,998

BI = SUNY-Binghamton
 BU.L = SUNY-Buffalo, Main
 BU.HS. = SUNY-Buffalo Health
 Sciences

Table VIIb. Number of Pounds Weight handled by UPS

C = Cornell
 S = Syracuse
 R. R. = Rush Rhees, Rochester
 R. M. = Miner, Rochester

LBS	D	J	F	M	A	M	J	J	A	S	C	N	D	J	F	E	A	M	J
BI	1662	2016	1572	557	1119	971	321	370	694	476	331	971	1683	926	1328	1095	1265	1830	0
BU.L	1616	2054	1738	2183	2571	1431	1512	833	2717	1741	2536	1431	2533	3299	2255	2310	2870	3665	1025
U.HS	467	1528	966	1436	2094	3282	1850	2181	2147	1897	2180	2651	2601	3524	1946	3215	2956	2985	1735
C	3618	3583	3043	3465	3865	2730	2608	3218	3816	2824	4460	4269	3984	4275	4651	4945	4550	2300	0
S	1666	2145	1804	1296	1607	1481	817	2564	1048	1153	870	1664	987	716	2755	2135	2010	1475	230
R.R.	2387	2697	1912	1711	2047	1673	2131	1738	2565	1338	3020	2745	1771	2614	2427	2765	2230	3365	1590
R.M.	1942	1886	1664	2219	2788	2164	1599	1866	2366	1318	2455	1465	1500	1000	500	800	800	1000	0
TOT	13418	16214	12699	13967	16096	14232	10838	12715	15358	10747	1652	15696	15059	17354	15592	17465	16675	16620	4580

Table VIIc. Amount of Invoices (includes pick up charge where applicable)

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LIBRARY	TOTAL PACKAGES	TOTAL WEIGHT IN LBS.	TOTAL COST
Binghamton	177	1731	191.92
Buffalo-Main	670	2362	416.25
Buffalo-Health Sci.	690	2167	429.40
Cornell	732	3393	656.64
Syracuse	390	1959	294.58
Rochester-Main	409	1762	427.26
Rochester-Medical	229	924	296.32
Total Cost to FAUL	3297	14298 lbs.	\$2712.37

Table VIII. Summary of UPS Invoices

The monthly tables are summarized in Table VIII. Over the entire experimental period the average parcel weighed four pounds, five ounces and cost \$0.81, or an average of 18.8¢ per pound. The rate structure of UPS is based on the weight of packages and the distance of their destination. The rate per pound drops the heavier the parcel, for example from 29¢ per pound for a two pound parcel to 10¢ per pound for a ten pound parcel. Thus the average cost per library will vary depending upon the nature of its traffic with other libraries. The average cost per parcel per library varied from 62¢ at each Buffalo library to \$1.29 at Rochester's Miner Medical Library. Syracuse University, at 86¢ per package, was closest to the overall average of 81¢.

Some interesting anomalies appear if Table VIIc is examined. The lowest monthly bill (excluding June 1971 when the service had officially ceased) was for the lowest weight and the lowest number of parcels, viz:

Lowest monthly Invoice	→	Lowest Weight	→	Lowest Parcels
(Sept. 70) \$107.47		(Sept. 70) 496 lbs.		(Sept. 70) 122 parcels

The highest invoice, however, was neither for the highest weight nor number.

Highest monthly Invoice	→	Highest Weight	→	Highest Parcels
(Jan. 71) \$173.54		(Mar. 71) 1039 lbs.		(Apr. 70) 331 parcels

In fact, the highest price did not cover either highest weight (Jan. 71 is 7th in the scale of weights) or highest parcels (3rd in scale). The highest weight was carried for \$172.65 (Mar. 71, 2nd in scale); the highest parcels for only \$153.58 (April 70, 9th in scale). This is curious since the UPS structure appears to favor fewer, heavier parcels. Presumably the cause of the anomaly is the varying distance over which the parcels were carried.

The parcel service was not significantly faster than the ordinary library rate using U. S. Mail and yet was costing, at 81¢ per pound, much more per pound than the library rate.

b. Traffic Between Libraries

After the experiment had ended each library supplied the FAUL Office with data from which an account of the usage of the system for the last two months of the system (April and May 1971) could be reconstructed. The FAUL Office was particularly concerned to establish the destination of the parcels as this data is not available from a UPS invoice.

Table IX shows the total items (not parcels) dispatched from each library and their destination. Two explanatory notes are necessary about the Table. Firstly, due to some misunderstanding, statistics for Cornell and Rochester Miner Medical Library are not complete for these two months. To balance the picture, traffic figures for these libraries have been extrapolated from previous months. Secondly, Buffalo Health Sciences Library and Rochester Miner Library had been given permission to include in its dispatch parcels for the SUNY Upstate Medical Center Library in Syracuse, although that library is not a member of FAUL. One other parcel (for Atlanta, Georgia) was accidentally included in the dispatch.

TABLE IX DESTINATION OF TOTAL ITEMS DISPATCHED, APRIL - MAY 1971

FROM:	TO:	Bi	BuL	BuHs	C	S	RR	RM	OTHER*	TOTAL
Bi			0	0	269	0	0	0	0	269
BuL		3		Campus	95	12	21	0	0	131
BuHs		0	Campus		13	0	0	29	42	84
C*		26	32	0		14	22	0	0	94
S		0	8	1	34		9	0	0	52
RR		0	19	1	13	4		Campus	1	38
RM		0	0	18	0	0	Campus		5	23
										691

* See preceding paragraph

Within the FAUL System, material may be carried for three reasons, viz; the normal interlibrary loan and return transactions, and the return to libraries of material which had been loaned directly to Faculty and Doctoral Students of FAUL Universities under the FAUL In-Person Borrowing Privilege System. For example, the high traffic from Binghamton to Cornell is predominantly the return of Borrowing Privilege Loans.

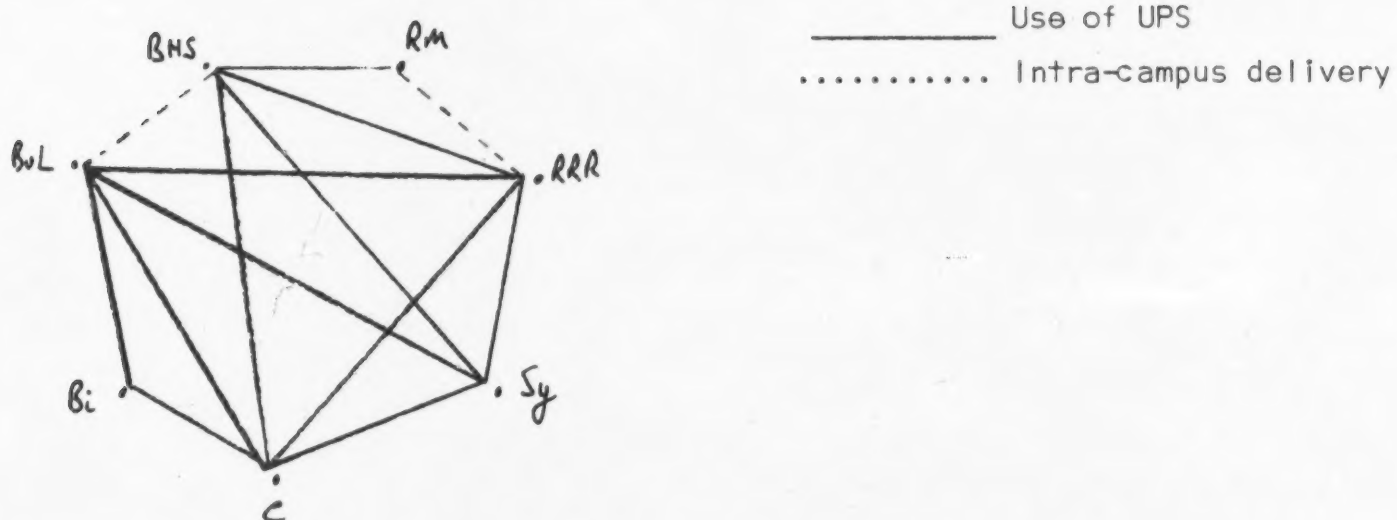
From the point of view of a transit system, what is important is the number of items to be carried and the destination, not the reason for their dispatch. Table X shows the total number of items carried between any two libraries, regardless of the direction in which the item travelled.

TABLE X TOTAL ITEMS BETWEEN ANY TWO FAUL LIBRARIES, APRIL - MAY 1971

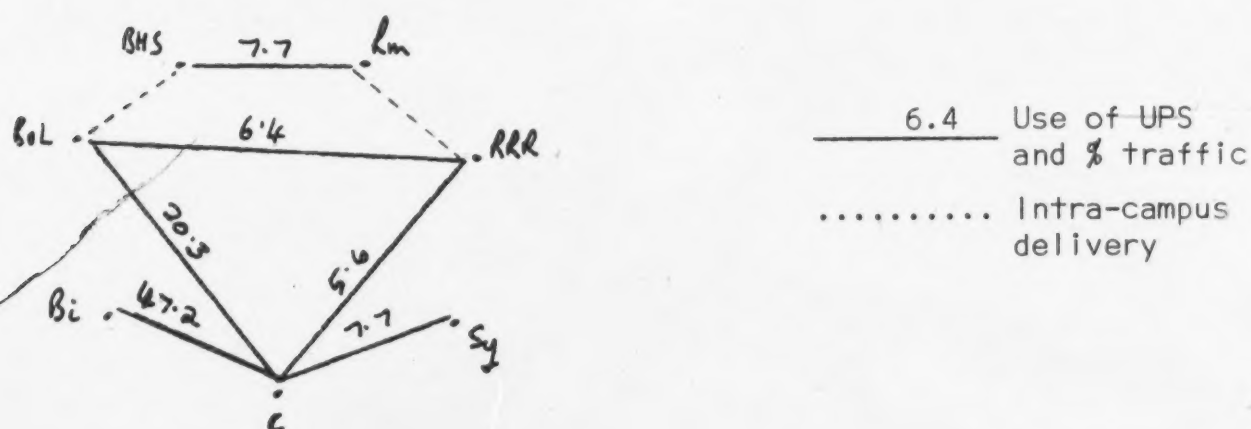
LIBRARY	Bi	BuL	BuHs	C*	S	RR	RM*
Bi		3	0	295	0	0	0
BuL	3		Campus	127	20	40	0
BuHs	0	Campus		13	1	1	47
*C	295	127	13		48	35	0
S	0	20	1	48		13	0
RR	0	40	1	35	13		Campus
*RM	0	0	47	0	0	Campus	

*Based on extrapolated figures

All reported links may be schematized as follows:--



Examination of Table X, however, reveals that only six links carry an amount of material that exceeds 5% of the total. If these links only are charted as above, the following figure results:--



This pattern accounts for 94.9 % of all traffic

c. The Future of a Delivery System

What can be learned for the future? Firstly, much more needs to be known about the traffic between libraries before a system can be planned. Both the volume, frequency and nature of the traffic needs to be studied. It is not necessary for a delivery system to be all-inclusive, carrying all traffic between all libraries. It should be possible to identify the best transit mode for each link rather than force all traffic into the same mode. It may be found, for example, that a rented truck may best serve one link, first class mail another and a parcel service yet another.

Secondly, a delivery system must be responsive to changing conditions. In the last few months, for example, U. S. Mail rates have increased, and one writer ('just b'twx us,' (4), p. 9, 1971) has already estimated that this change could increase ILL costs by 100%. Similarly, the South Central 3R's program has recently taken over the link between SUNY-Binghamton and Cornell, a link which accounted for 47.2% of items in the FAUL traffic. Clearly, both of these examples would have a profound effect on a delivery system. As the other FAUL programs progress the traffic between libraries may increase, thus forcing the traffic activity to a level where another system may be cheaper than U. S. Mail. The development of a central store facility, or of a shared delivery system with other library systems, would radically change the picture, as would a deterioration in the mail service.

Both of the above paragraphs point to the fact that changing conditions have constantly to be monitored. It is proposed that a system be instituted in which FAUL ILL performance figures can be periodically reported in a consistent form to FAUL Central Office where they can be accumulated and examined.

A system which is responsive to the needs can be developed only on the basis of accurate, timely information. FAUL libraries must be always prepared to change their methods in order to take advantage of the best current solution to their problems.